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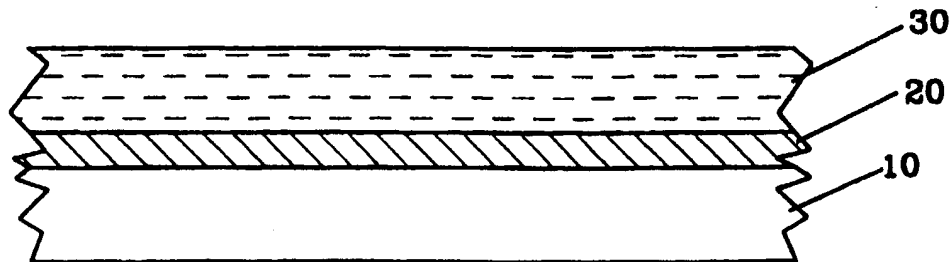


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(54) Title: LITHIUM ANODES FOR ELECTROCHEMICAL CELLS



(57) Abstract: Provided are anodes for use in electrochemical cells, wherein the anode comprises an anode active layer comprising lithium and a polymer anode substrate comprising a polymer film layer and a protective crosslinked polymer layer, in which the protective crosslinked polymer layer is in contact with the anode active layer on the side opposite to the surface in contact with the polymer film layer. The present invention also pertains to methods for forming such anodes and electrochemical cells comprising such anodes. The polymer film layer may be a terephthalate, a naphthalate, or an isophthalate, i.e. a polyester film. The protective crosslinked polymer layer may consist of acrylate polymer.

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A. CLASSIFICATION OF SUBJECT MATTER
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According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 478 676 A (TURI ERAN ET AL) 26 December 1995 (1995-12-26) abstract; figures 2,3 column 2, line 10 - line 17 column 3, line 7 - column 4, line 6 column 4, line 44 - line 45; examples 12,14	12-14, 22,23
Y	---	1-3,6,9
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Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>US 4 615 961 A (PARK GEORGE B ET AL) 7 October 1986 (1986-10-07)</p> <p>abstract column 2, line 50 -column 3, line 27 column 4, line 21 - line 32 column 6, line 30 - line 55 column 8, line 11 - line 15 column 10, line 4 - line 8</p>	12,15, 19,20, 22,23
Y	---	1,6-9
X	<p>US 5 066 554 A (HOPE HENRY F ET AL) 19 November 1991 (1991-11-19) abstract; figure 3 column 2, line 14 - line 49</p>	12,20, 22,23
Y	---	1,6-9
Y	<p>US 5 395 644 A (AFFINITO JOHN D) 7 March 1995 (1995-03-07) column 2, line 25 - line 27 column 3, line 49 -column 4, line 32 column 5, line 10 - line 37</p>	1-3,6-9
A	<p>US 6 277 514 B1 (YING QICONG ET AL) 21 August 2001 (2001-08-21) the whole document</p>	22

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5478676	A	26-12-1995	EP 0782771 A1	09-07-1997
			JP 11505660 T	21-05-1999
			WO 9604689 A1	15-02-1996
US 4615961	A	07-10-1986	AT 60464 T	15-02-1991
			AU 573637 B2	16-06-1988
			AU 3496184 A	09-05-1985
			CA 1244876 A1	15-11-1988
			DE 3484011 D1	28-02-1991
			EP 0146246 A1	26-06-1985
			GB 2149565 A , B	12-06-1985
			IL 73398 A	20-10-1987
			IN 163202 A1	20-08-1988
			JP 60115156 A	21-06-1985
			ZA 8408594 D	30-07-1986
US 5066554	A	19-11-1991	NONE	
US 5395644	A	07-03-1995	US 5260095 A	09-11-1993
			US 5547508 A	20-08-1996
			AT 170779 T	15-09-1998
			CA 2142895 A1	03-03-1994
			DE 69320971 D1	15-10-1998
			DE 69320971 T2	27-05-1999
			DK 655954 T3	07-06-1999
			EP 0655954 A1	07-06-1995
			JP 8503099 T	02-04-1996
			WO 9404285 A1	03-03-1994
US 6277514	B1	21-08-2001	US 6183901 B1	06-02-2001
			US 6194098 B1	27-02-2001
			AU 2196000 A	03-07-2000
			AU 2368100 A	03-07-2000
			CN 1334969 T	06-02-2002
			CN 1334970 T	06-02-2002
			EP 1151486 A1	07-11-2001
			EP 1149425 A1	31-10-2001
			WO 0036670 A1	22-06-2000
			WO 0036671 A1	22-06-2000
			US 2001053475 A1	20-12-2001
			US 2001000485 A1	26-04-2001
US 6410182 B1	25-06-2002			